

MILL CREEK FISHERY DEVELOPMENT. PART II. ADDENDUM

Comment from an anonymous reviewer suggested that we look at the MAXIMUM DAILY MEAN water temperature (MDM) criterion in Figure 3, Lyons et al. (2009) and use it to evaluate Mill Creek thermal habitat. The definition for the MDM is given in on page 1133 in Lyons et al. (2009) as the “warmest daily mean temperature during the summer”. Summer is later defined on page 1133 as “June 1-August 31”. For the purpose of this discussion we are assuming this means:

$$\text{Sum daily maximum temperature, June 1-August 31 / 92 days} = \text{MDM}$$

We have maximum daily water temperature data for June 17-August 7, 2010 and believe the July data alone can give a conservative (worst-case) approximation of the MDM for the June-August time period because Ann Arbor Michigan July air temperatures are tightly correlated with July Mill Creek mean water temperatures ($R^2 = 0.7159$; Figure 5) and long-term mean June and August air temperatures are lower than the July temperature (80 and 81°F, versus 84°F). Thus, the JULY MAXIMUM DAILY MEAN water temperature (JMDM) in Mill Creek would also be a conservative approximation of the MDM. The JMDM is calculated as follows:

$$\text{Sum daily maximum temperature, July 1-31 / 31 days} = \text{JMDM,}$$

Table 3 from Lyons et al. (2009) is as follows:

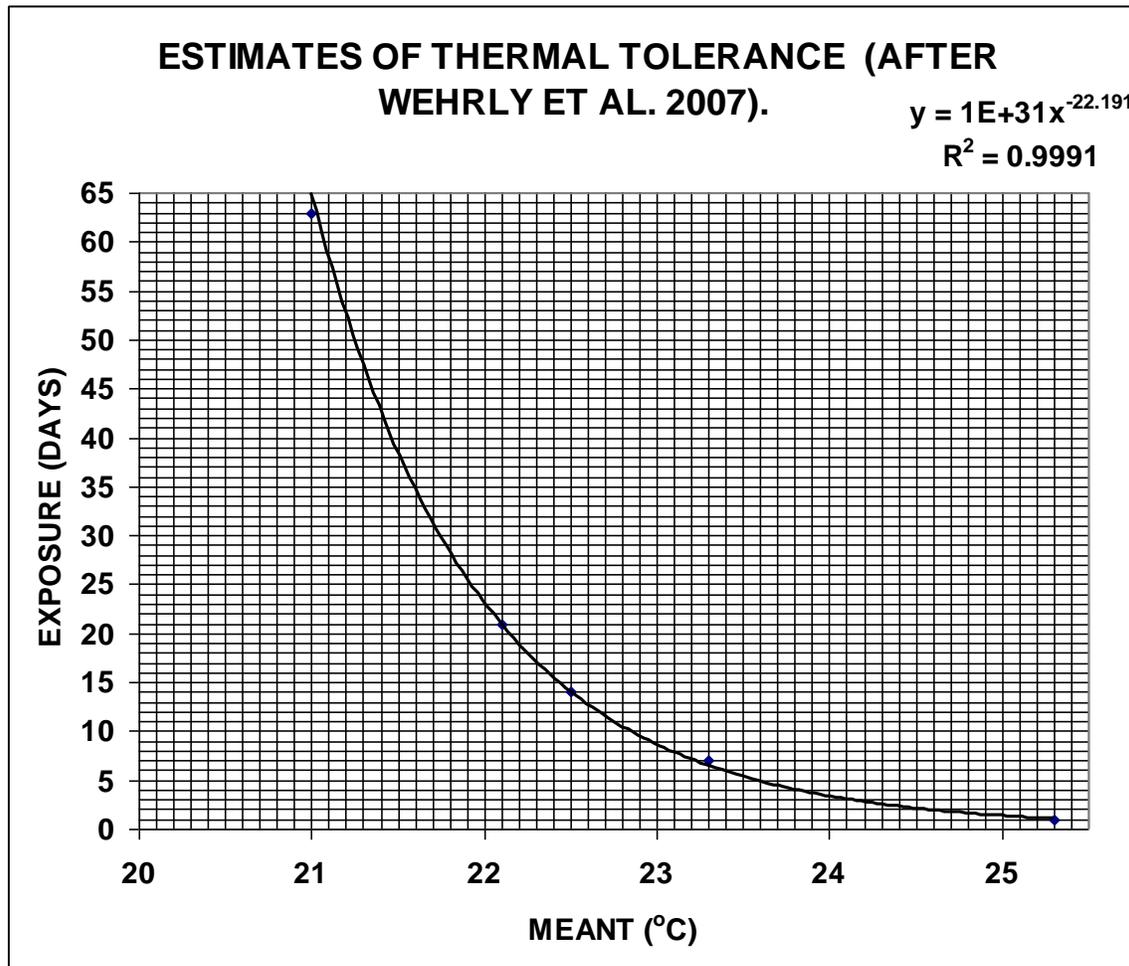
Habitat class	July mean temp (°F)	MDM (°F)
Cold (C)	<63.5	<69.3
Cold–transitional (CT)	63.5-67.1	69.3-72.7
Warm-transitional (WT)	67.1-69.8	72.7-76.3
Warm (W)	>69.8	>76.3

The JMDM water temperatures for Mill Creek for 2010 and corresponding habitat class from Table 3 above are as follows:

Site	Sharon	Sylvan	M-52 S	M-52 N	Scio Ch	Dancer	Jerusalem	Dexter
JMDM	72.7	76.3	63.8	70.9	71.4	69.9	67.7	74.2
Habitat class	CT	WT	C	CT	CT	CT	C	WT

Thus, the JMDM criterion indicates our sites in 2010 were C, CT, and WT , all of which would have supported trout.

A second reviewer suggested we also use Wehrly et al. (2007) to evaluate our temperature data and estimate the suitability of creek temperatures for trout. To that end we: (1) calculated 3-, 7-, and 14-day MEANTs (the maximum n-day mean temperature) from our data for the Middle Reach of the creek (data for M-52 North, Scio Church, and Dancer, pooled and averaged) and also, separately, for Sylvan and Dexter, and (2) created the following working copy of Figure 2 from Wherley et al.(2007), that allowed us to evaluate our July 2010 MEANT data.



For exposures of 3, 7, and 14 days, our July MEANTs for the Middle Reach were 70.7, 69.8, and 69.4°F (21.5, 21.0, and 20.8°C, respectively). These values fell to the left of the curve indicating trout would have survived in the Middle Reach in July 2010. Because the July 2010 water temperatures for Sharon, M-52 South, and Jerusalem were lower than those in the Middle Reach we did not calculate MEANTS for those three sites. For an exposure of 3 days, our July MEANTs for Dexter (75.0°F, 23.9°C) and Sylvan (75.7°F, 24.3°C) fell almost on the curve indicating little or no survival unless trout at those locations in July 2010 migrated to adjacent thermal refugia.

